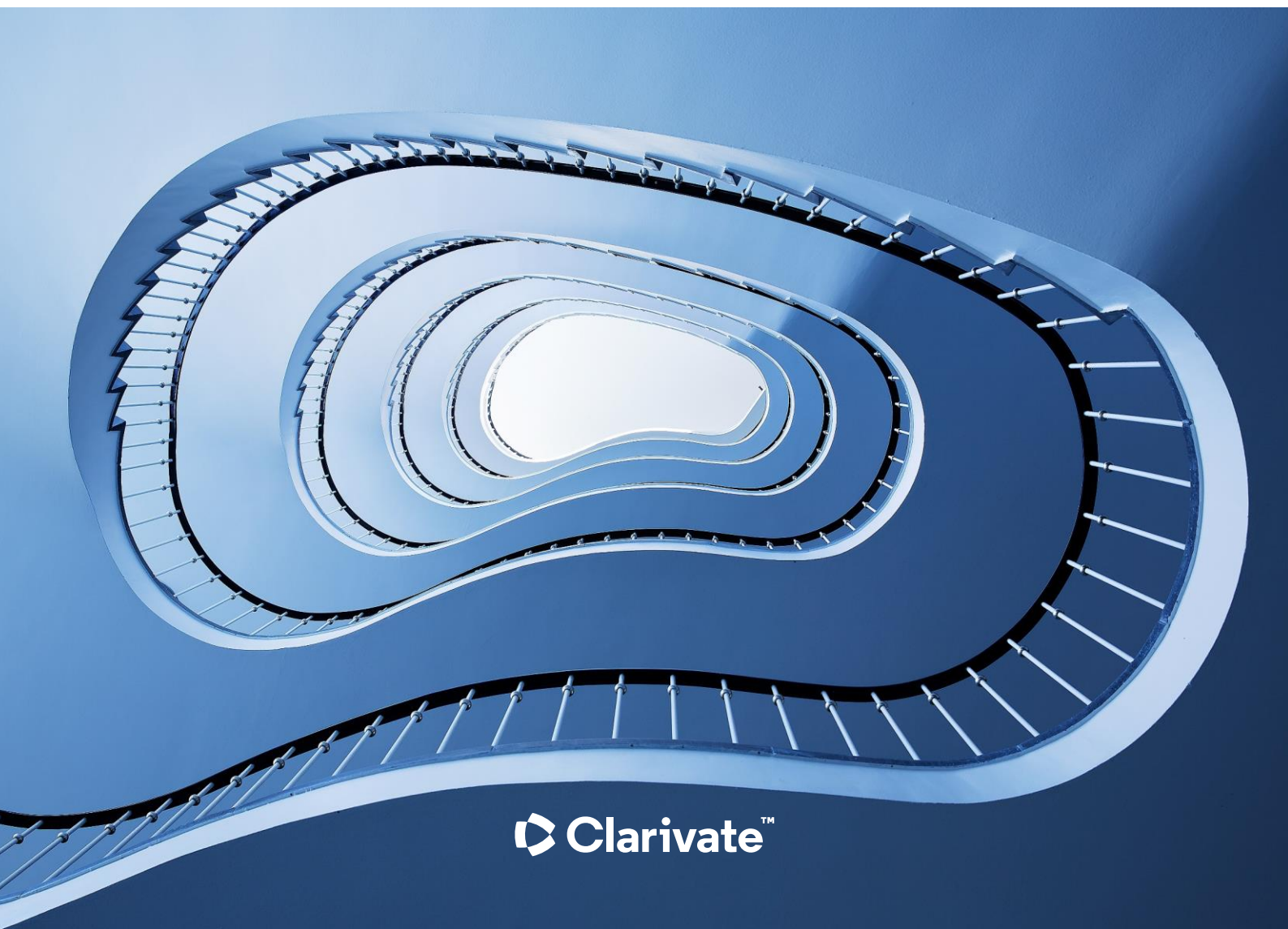


Highly Cited Researchers 2024: Evaluation & selection

November 2024



The Highly Cited Researchers™ list from Clarivate™ seeks to identify individual researchers in the sciences and social sciences who have demonstrated significant and broad influence in their field(s) of research.

Our evaluation and selection strategy is not one-dimensional; the process is complex and determined by combining the inter-related quantitative and qualitative information available to us.

Foundational past, visionary future

About the Institute for Scientific Information™

The Institute for Scientific Information at Clarivate has pioneered the organization of the world's research information for more than half a century. Today the ISI champions responsible research assessment by supporting the principles that consider a holistic and fair evaluation of scientific work.

It remains committed to promoting integrity in research while enhancing the retrieval, interpretation and application of scientific information.

It maintains the knowledge corpus upon which the Web of Science™ index and related information and analytical content and services are built.

It disseminates that knowledge externally through events, conferences and publications and conducts primary research to continuously expand, improve and strengthen the knowledge base.

For more information and to receive future ISI analyses and reports, please visit <https://clarivate.com/the-institute-for-scientific-information/isi-reports/>

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1: Overview

The Highly Cited Researchers program is an annual recognition of influential researchers in the sciences and social sciences from around the world, highlighting those who have demonstrated significant and broad influence in their field(s) of research.

Representing just 1 in 1,000 of the global research community, these individuals are identified based on their publication of Highly Cited Papers™ in the Web of Science Core Collection™ – the world's most trusted publisher-independent global citation database.

Using rigorously curated data, experts at the Institute for Scientific Information (ISI) select individuals who have demonstrated remarkable influence in their field.

As the need for high-quality, reliable data from rigorously selected sources grows, we continue to refine our evaluation and selection policies to address the challenges of an increasingly complex and polluted scholarly record.

This year Clarivate awarded 6,886 Highly Cited Researcher designations to 6,636 individuals. The list focuses on contemporary research achievement as we survey Highly Cited Papers in trusted science and social sciences journals indexed in [Science Citation Index Expanded™](#) and [Social Sciences Citation Index™](#) during the 11-year period 2013 to 2023. The data derive from Essential Science Indicators™ (ESI), a component of [InCites™](#).

For our 2024 analysis we reviewed Highly Cited Papers from 20 broad fields in ESI. These fields are defined by journal groupings and in the case of multidisciplinary journals such as *Nature* and *Science*, papers are individually assigned to a field based on cited reference analysis. Only article and review papers are considered; citations to letters, correction notices and other items are excluded. This year we have once again omitted the Mathematics category from our analysis. See our [FAQs section](#) for further information.

2: Awardee selection

Our first stage of analysis begins with a quantitative analysis – a citation triage of records to identify a list of candidates. We identify authors with a significant number of Highly Cited Papers in an ESI field at the threshold for inclusion and above.

For the Highly Cited Researchers 2024 analysis, the papers surveyed were those published during 2013 to 2023. We then ranked all papers in the top 1% by citations for their ESI field and year (the definition of a highly cited paper).

Researchers who, within an ESI-defined field, publish Highly Cited Papers are judged to be influential, so the authorship of multiple top 1% papers is interpreted as a mark of exceptional impact. To recognize more junior and mid-career researchers is one of our goals in generating this list and relatively younger researchers are more likely to emerge in such an analysis than in one dependent on total citations over many years.

The determination of how many researchers to examine for each field is based on the population of each field, as represented by the number of disambiguated author names on all Highly Cited Papers in that field, from 2013 to 2023.

The square root of the number of authors in each field determines the number of individuals selected – the number of researchers identified by ESI field varies, with Clinical Medicine being the largest and Economics and Business being the smallest in 2024. When ranked by paper count the number of papers associated with the author at the square root position becomes the field paper threshold.

Another criterion for selection is that the researcher must have enough citations to their Highly Cited Papers to meet the author field citation threshold found within ESI. All who published Highly Cited Papers and received citations at the field threshold level are considered at this stage – even if the final list then exceeds the number given by the square root calculation.

In addition, a researcher with one fewer Highly Cited Paper than the field-specific threshold number is also considered, providing their total citations for Highly Cited Papers place them in the top 50% by total citations of those meeting or exceeding the threshold.

We then begin our in-depth qualitative analysis based on this list (see [Exceptions and exclusions](#)).

Example - fictional authors

ESI field	Name	Highly Cited Papers	Citation to Highly Cited Papers	Field paper threshold	Author field citation threshold	Author field citation threshold if one fewer paper than threshold number	Status
Field 9	Mary Pandit	17	2,838	11	1,112	2,920	Considered
Field 9	William Clever	10	3,677	11	1,112	2,920	Considered
Field 9	Judith Sage	10	1,338	11	1,112	2,920	Not considered

- Mary Pandit meets both field paper threshold and author field citation threshold, so is considered for selection
- William Clever has one less paper than the paper threshold but meets the one less paper author field citation threshold and so is considered for selection
- Judith Sage does not meet the paper threshold or either citation threshold and so is not considered for selection

3: Cross-field impact

This is the seventh year we have sought to identify researchers with cross-field impact – those who might contribute multiple Highly Cited Papers in several different fields – but would not register enough Highly Cited Papers in any single ESI field to be considered for selection.

The recognition of these researchers keeps our list contemporary and relevant as it tends to capture younger researchers and those who work at the intersection of different scientific or scholarly domains.

To identify researchers with cross-field influence, highly cited paper and citation counts are normalized through fractionating according to the thresholds required for each field (thus, each Clinical Medicine paper has a smaller unit fraction than one in Space Science). Citation counts are fractionated in a similar manner. If the sum of the publication counts and the sum of the citation counts for a researcher equals 1.0 or more, the individual exhibits influence equivalent to a researcher selected in one or more ESI defined fields and is therefore selected as a candidate for exceptional cross-field performance.

Example

ESI field	Name	Highly Cited Papers	Citation to Highly Cited Papers	Field citation threshold	Field paper threshold	Field paper score	Field citation score	Cross-field paper score	Cross-field citation score
3	Joseph Savant	1	98	1,857	22	0.045	0.053	1.670	5.666
6	Joseph Savant	7	2,937	946	8	0.875	3.105	1.670	5.666
14	Joseph Savant	3	663	676	6	0.5	0.981	1.670	5.666
16	Joseph Savant	4	3,397	2,223	16	0.25	1.528	1.670	5.666

The fictional researcher Joseph Savant published 15 Highly Cited Papers in four ESI fields from 2013 to 2023. Seven papers in Field 6, with a threshold number of eight for selection, earned Savant a credit of .875 (or 7/8ths). Three papers in Field 14, with a threshold number of six for selection, were worth 0.5. The sum of the fractional paper counts in each field yielded a total Cross-Field paper score of 1.67. A score of 1 or more indicates that the individual achieved impact equivalent to a researcher chosen in a specific ESI field. The second criterion for consideration as a Highly Cited Researcher is enough citations to rank in the top 1% by citations for a field. Again, citations in different fields were fractionated in a similar manner to the treatment of papers. In the example above, Professor Savant earned more than five times the number of citations needed for selection as an influential cross-field researcher.

4: Exceptions & exclusions

Clarivate is trusted by many organizations involved in research evaluation and assessment – including universities, governments, research assessment and ranking organizations globally to provide accurate, verifiable and trustworthy data.

As we identify individuals who show significant and broad influence in their chosen field or fields, we have added more filters and checks to our analysis. Our evaluation and selection strategy is not one-dimensional, the process is more complex than ever and determined by combining the inter-related information available to us.

Some decisions are straight-forward – to award credit to a single author among many tens or hundreds listed on a paper strains reason. Therefore, we eliminate any Highly Cited Paper with more than 30 authors or explicit group authorship as defined by publisher, from our analysis. Beyond this, researchers found to have committed scientific misconduct in formal proceedings conducted by a researcher's institution, a government agency, a funding agency, or a publisher cannot be selected as a Highly Cited Researcher.

ESI field of Mathematics

We have excluded the Mathematics category from our analysis for this year. The field of Mathematics differs from other categories in ESI. It is a highly fractionated research domain, with few individuals working on a number of specialty topics. The average rate of publication and citation in Mathematics is relatively low, so small increases in publication and citation tend to distort the representation and analysis of the overall field. Because of this, the field of Mathematics is more vulnerable to strategies to optimize status and rewards through publication and citation manipulation, especially through targeted citation of very recently published papers which can more easily become highly cited (top 1% by citation). This not only misrepresents influential papers and people; it also obscures the influential publications and researchers that would have qualified for recognition. The responsible approach now is to afford this category additional analysis and judgement to identify individuals with significant and broad influence in the field.

Because Clarivate is trusted by global organizations for research evaluation and assessment, we have a responsibility to provide accurate, verifiable, and trustworthy data. At the Institute for Scientific Information, we must make difficult choices in our commitment to respond to threats to research integrity across many fields. Our response to this concern has been to take advice from experts and consult with leading bibliometricians and mathematicians to discuss our future approach to the analysis of this field.

Upholding research integrity

Together with our community partners, we need to play our part to respond to a rise in threats to research integrity in many areas. So, we examine for any anomalies in the scholarly record which may seriously undermine the validity of the data analyzed for Highly Cited Researchers. These activities may represent efforts to game the system and create self-generated status.

Since 2022, with the assistance of Retraction Watch and its unparalleled database of retractions, we have extended our qualitative analysis to all retracted papers to detect for evidence of cases in which a candidate's publications may have been retracted for reasons of misconduct (such as plagiarism, image manipulation, fake peer review). We search for evidence of publication anomalies for those individuals under consideration for this program. This extended analysis proved valuable in identifying researchers who do not demonstrate true, community-wide research influence.

We also receive expressions of concern from identified representatives from research institutes, national research managers and our institutional customers along with information shared with us by other collective community groups. Some of these resources include anonymous or 'whistleblower sources. We also consider these, where we can verify claims through direct independent observation.

Our response evolves each year, and we now look at a growing number of factors when evaluating papers including, but not limited to:

- Extreme levels of hyper-authorship of papers. Our expectation is that an author has provided a meaningful contribution to any paper which bears their name and the publication of multiple papers per week over long periods strains our understanding of normative standards of authorship and credit.
- Excessive self-citation – We exclude papers which reveal unusually high levels of self-citation. For each ESI field, a distribution of self-citation is obtained, and extreme outliers (a very small fraction) are identified and evaluated. We also look for evidence of prodigious, very recent publications that represent research of incremental value, accompanied by high levels of author self-citation. For a description of the methodology used to exclude authors with very high levels of self-citation, please see: Adams, J., Pendlebury, D. and Szomszor, M., "[How much is too much?](#) – The Difference between Research Influence and Self-Citation Excess," *Scientometrics*, 123 (2):1119–1147, May 2020.
- Unusual patterns of collaborative group citation activity and anomalous levels of citations from co-authors. The identification of networks of co-authors raises the possibility that an individual's high citation counts may be highly reliant on citations from this network; if more than half of a researcher's citations derive from co-authors, we consider this to be narrow influence, rather than the broad community influence we seek to reflect.

ISI analysts use other filters to identify anomalous publishing activities. We can report, with the implementation of more filters, the number of candidates excluded from our final list increased from 500 in 2022, more than 1,000 in 2023 and more than 2,000 in 2024.

We explicitly call for the research community to police itself through thorough peer review and other internationally recognized procedures to ensure integrity in research and its publication.

5: Researcher affiliations

Clarification of how we identify, request and publish primary researcher affiliations for the Highly Cited Researchers program

We acknowledge that many of the individuals named to our list have genuine, complex research affiliations. Due to this complexity and high levels of mobility for many researchers, Clarivate asks preliminary candidates of the Highly Cited Researchers program to help verify their affiliations to us each year prior to launch.

Our published list then reflects the information available from the scholarly record (i.e., the contact details on their Highly Cited Papers across an eleven-year window), combined with any requested updates from the researchers themselves.

For this program a primary affiliation is defined as the researcher's home institution - typically at a location where they reside, conduct the majority of their work and usually hold a permanent tenured position.

The incentives to achieve Highly Cited Researcher status are quite high in some nations and research systems and occasionally researchers are invited to become affiliated researchers at other institutions as part of a fellowship program.

A Research Fellowship is not recognized as a primary affiliation when we can clearly observe that a researcher is located and has permanent tenure elsewhere and these individuals are not counted in our own ranking of nations or institutions.

This year we introduced additional affiliation checks for complex cases to ensure accuracy. This often includes a requirement for additional evidence to be provided by institutional contacts.

Clarivate endorses the actions of universities and research organizations to monitor and manage the activities and behaviors of their employees with respect to specifying correct home institutions which reflect their permanent, tenured positions. See our statement on this topic [here](#).

6: Disclaimer

There is no unique or universally agreed concept of what constitutes exceptional research performance and elite status in the sciences and social sciences and there are many highly accomplished and influential researchers who may not be recognized by our chosen method of evaluation and selection.

The only reasonable approach to interpreting a list of researchers such as ours is to fully understand our chosen method of evaluation and selection.

Consequently, no list can satisfy all expectations or requirements – a different basis or formula for selection would generate a different (though likely overlapping) list of names and the absence of a name on our 2023 list should not be interpreted as inferior performance or stature in comparison to others selected.

With that knowledge, the results may be judged by users as relevant or irrelevant to their needs or interests.

About Clarivate

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The Web of Science™ is the world's largest publisher-neutral citation index and research intelligence platform. It organizes the world's research information to enable academia, corporations, publishers and governments to accelerate the pace of research.

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